UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 9
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March 2, 2001

MEMORANDUM

SUBJECT: Perchlorate Occurrence Table and Maps

FROM: Kevin P. Mayer, SFD-7-2

TO: Recipients of Perchlorate Maps and Table

This memo is meant to accompany a table of perchlorate occurrence and two maps produced EPA Region 9's GIS Center. These maps are entitled " U.S. Perchlorate Manufacturers and Users" and "U.S. Perchlorate Releases". The Table is entitled "Occurrence and Potential Sources of Perchlorate Releases to the Environment as of November 2000". The map of U.S. Perchlorate Releases displays the locations of the facilities listing in the table. All locations on the Releases map are also depicted on the Manufacturers and Users map, along with all other locations identified by the sources noted on the Manufacturers and Users map. The table and maps rely on information available to EPA in late November, 2000.

Information on Perchlorate Releases

The table and map of known perchlorate releases to the environment was an effort by contacts in all ten Regions of the U.S. Environmental Protection Agency to bring together the available nationwide information on where this chemical has been detected in the environment. The investigations that are the source of the data represent diligent and often ground-breaking efforts of state and local authorities as well as that of EPA offices.

Because the information was gathered for various purposes and with different and sometimes unspecified protocols, it is essential to explicitly explain what these data do and do not represent.

An Ongoing Effort to Communicate Information To-Date

We felt that it was important to begin the process of communication even if the initial result was incomplete or imperfect. We deliberately intended this document to spur corrections, additions or deletions of the information contained in the table. There has been no standardized approach to collecting or reporting perchlorate data nationwide.

We did intend to raise awareness that this hitherto unrecognized chemical is being found in water systems in nearly every type of climatic regime in the US. In some instances, perchlorate was unexpectedly detected in areas where no obvious perchlorate handling activities took place. In most others, perchlorate was found in the environment near facilities that were documented users or manufacturers of perchlorate salts.

Standards for Reporting Perchlorate Releases

We attempted to apply reasonable judgement in identifying "confirmed" releases and even in identifying "unconfirmed releases". In California, public water supply wells must have detectable levels of perchlorate in at least two sampling periods before being considered actually detected. Most of the sites we listed from California and other states meet this criterion. At sites with many sampling points, multiple detections provided a preponderance of evidence that a perchlorate release had occurred. We omitted at least one site where perchlorate was detected once but not in subsequent sampling events. The American Water Works Service Company published a report (Siddiqui et al., 1998) identifying wells in their systems nationwide with perchlorate detections, and we included these locations even though we could not consider them confirmed. Resampling by AWWSC failed to detect perchlorate in a number of these wells. EPA Region 3 investigated the Yardley, PA, report from AWWSC but could not detect perchlorate in nearby groundwater. We felt it important to recognize this report but to note the lack of independent corroboration.

Perchlorate in soil posed another set of difficulties in reporting a site as having a confirmed release. Without a standardized sampling and analytical protocol, quantification of soil concentrations could be misleading and were omitted from the table. The solubility of perchlorate salts is so great that perchlorate-containing material found uncontained on the soil surface might reasonable be assumed to be contributing perchlorate to the subsurface through inevitable dissolution. We do have a number of sites where the association between soil contamination and groundwater contamination is strongly established. There are also sites where no water samples have yet been analyzed even though perchlorate has been detected in surface soils. The distribution of a solid perchlorate-bearing material on the soil surface may not be uniform. In at least one instance, identifiable pieces of a perchlorate-bearing propellant were gathered from the soil surface and is reported as a confirmed release.

Some Acknowledged Limitations

Obviously, few details or clarifying information can be contained in a single table much less in a single number. The table provides only a single maximum concentration value for any site. It is very possible that the information may not provide an accurate picture of any particular site. At some sites, samples have been collected for over three years at literally hundreds of monitoring points with fastidiously documented quality control. At others we have only a single monitoring point with perhaps only two water samples analyzed for perchlorate and no statistical evaluation is possible. The maximum value is not necessarily representative of the nature and extent of the perchlorate release for the site, and the maximum value may be much higher than any other value at that location.

Although many of the data originated from site-specific investigations, this document does not presume to definitively identify the facility responsible for the release nor the type of operation associated with the release. Some of the facilities are fairly isolated and have clear histories of perchlorate handling. Others facilities mentioned are reasonable possibilities based on current information. There are a few with completely unidentified sources - occasionally with several potential contributors.

Difference in Search Effort Throughout the United States

It is important to realize that the lack of perchlorate releases in a particular state or locality may merely reflect the absence of an effort to search for this contaminant. Neither the table nor the map indicates the extent of the investigation activities where perchlorate was not detected. Widespread monitoring efforts occurred in only a handful of states by the year 2000: Arizona, California, Iowa, Nebraska, New Mexico, New York (Suffolk County), Texas and Utah. Few perchlorate investigations have occurred in the eastern United States. Notable exceptions are at specific facilities in West Virginia, Maryland and the follow-up investigation in Pennsylvania. At the current state of knowledge, the distribution of perchlorate detections in the environment seems to be directly related to the effort put forth in searching for perchlorate.

A high proportion of the locations on the current list of reported perchlorate releases were specifically targeted for perchlorate testing. Perchlorate manufacturers provided EPA with information on known purchasers of the raw material, and the Department of Defense also identified possible locations where perchlorate was handled. At a number of sites, State or federal cleanup activities were ongoing before perchlorate was identified as an environmental issue.

A few of the localized efforts to search for perchlorate should be noted. California added perchlorate to the list of unregulated monitoring requirements in 1999 and California Department of Health Services officials have reported results from testing over 2,000 public water supply sources in addition to more than a thousand monitoring wells tested around the state. In eastern Long Island, more than 500 wells - public, residential and monitoring wells - have been tested throughout Suffolk County. Utah tests approximately 60 pubic water supply wells in areas that may be affected by perchlorate handling facilities. Arizona officials have tested for perchlorate in water supply samples collected throughout the state and are involved in investigations at several facilities that have the potential for perchlorate releases. Several states are working with EPA's Region 7 to test rural wells for agricultural chemicals and added perchlorate as an analyte in approximately 30 locations in Nebraska and nearly 100 locations in Iowa. Texas and New Mexico officials are aggressively investigating for perchlorate at many likely sources, even beyond those facilities identified by perchlorate manufacturers and the Defense Department.

Please direct questions or comments to

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